09/508342

5░░░░d PCT/PTO 10 MAR 2000

SPO-108

## SEQUENCE LISTING

<110> SAKAKI, Yoshiyuki

<120> Mammalian Genes Involved in Circadian Periods

<130> SEN-903PCT

<150> JP 9-267846
<151> 1997-09-12

<160> 4

<210> 1
<211> 1290
<212> PRT
<213> Homo sapiens

<400> 1
```
Met Ser Gly Pro Leu Glu Gly Ala Asp Gly Gly Gly Asp Pro Arg Pro
1               5                   10                  15

Gly Glu Ser Phe Cys Pro Gly Gly Val Pro Ser Pro Gly Pro Pro Gln
            20                  25                  30

His Arg Pro Cys Pro Gly Pro Ser Leu Ala Asp Asp Thr Asp Ala Asn
        35                  40                  45

Ser Asn Gly Ser Ser Gly Asn Glu Ser Asn Gly His Glu Ser Arg Gly
    50                  55                  60

Ala Ser Gln Arg Ser Ser His Ser Ser Ser Ser Gly Asn Gly Lys Asp
65                  70                  75                  80

Ser Ala Leu Leu Glu Thr Thr Glu Ser Ser Lys Ser Thr Asn Ser Gln
                85                  90                  95

Ser Pro Ser Pro Pro Ser Ser Ser Ile Ala Tyr Ser Leu Leu Ser Ala
```

SPO-108

```
                100                    105                    110
    Ser Ser Glu Gln Asp Asn Pro Ser Thr Ser Gly Cys Ser Ser Glu Gln
           115                    120                    125

    Ser Ala Arg Ala Arg Thr Gln Lys Glu Leu Met Thr Ala Leu Arg Glu
           130                    135                    140

    Leu Lys Leu Arg Leu Pro Pro Glu Arg Arg Gly Lys Gly Arg Ser Gly
           145                    150                    155                    160

    Thr Leu Ala Thr Leu Gln Tyr Ala Leu Ala Cys Val Lys Gln Val Gln
                          165                    170                    175

    Ala Asn Gln Glu Tyr Tyr Gln Gln Trp Ser Leu Glu Glu Gly Glu Pro
                   180                    185                    190

    Cys Ser Met Asp Met Ser Thr Tyr Thr Leu Glu Glu Leu Glu His Ile
                   195                    200                    205

    Thr Ser Glu Tyr Thr Leu Gln Asn Gln Asp Thr Phe Ser Val Ala Val
           210                    215                    220

    Ser Phe Leu Thr Gly Arg Ile Val Tyr Ile Ser Glu Gln Ala Ala Val
    225                    230                    235                    240

    Leu Leu Arg Cys Lys Arg Asp Val Phe Arg Gly Thr Arg Phe Ser Glu
                          245                    250                    255

    Leu Leu Ala Pro Gln Asp Val Gly Val Phe Tyr Gly Ser Thr Ala Pro
                   260                    265                    270

    Ser Arg Leu Pro Thr Trp Gly Thr Gly Ala Ser Ala Gly Ser Gly Leu
                   275                    280                    285

    Arg Asp Phe Thr Gln Glu Lys Ser Val Phe Cys Arg Ile Arg Gly Gly
           290                    295                    300
```

SPO-108

```
Pro Asp Arg Asp Pro Gly Pro Arg Tyr Gln Pro Phe Arg Leu Thr Pro
305             310             315             320

Tyr Val Thr Lys Ile Arg Val Ser Asp Gly Ala Pro Ala Gln Pro Cys
            325             330             335

Cys Leu Leu Ile Ala Glu Arg Ile His Ser Gly Tyr Glu Ala Pro Arg
            340             345             350

Ile Pro Pro Asp Lys Arg Ile Phe Thr Thr Arg His Thr Pro Ser Cys
            355             360             365

Leu Phe Gln Asp Val Asp Glu Arg Ala Ala Pro Leu Leu Gly Tyr Leu
    370             375             380

Pro Gln Asp Leu Leu Gly Ala Pro Val Leu Leu Phe Leu His Pro Glu
385             390             395             400

Asp Arg Pro Leu Met Leu Ala Ile His Lys Lys Ile Leu Gln Leu Ala
            405             410             415

Gly Gln Pro Phe Asp His Ser Pro Ile Arg Phe Cys Ala Arg Asn Gly
            420             425             430

Glu Tyr Val Thr Met Asp Thr Ser Trp Ala Gly Phe Val His Pro Trp
    435             440             445

Ser Arg Lys Val Ala Phe Val Leu Gly Arg His Lys Val Arg Thr Ala
    450             455             460

Pro Leu Asn Glu Asp Val Phe Thr Pro Pro Ala Pro Ser Pro Ala Pro
465             470             475             480

Ser Leu Asp Thr Asp Ile Gln Glu Leu Ser Glu Gln Ile His Arg Leu
            485             490             495

Leu Leu Gln Pro Val His Ser Pro Ser Pro Thr Gly Leu Cys Gly Val
            500             505             510
```

```
Gly Ala Val Thr Ser Pro Gly Pro Leu His Ser Pro Gly Ser Ser Ser
        515                 520                 525

Asp Ser Asn Gly Gly Asp Ala Glu Gly Pro Gly Pro Pro Ala Pro Val
        530                 535                 540

Thr Phe Gln Gln Ile Cys Lys Asp Val His Leu Val Lys His Gln Gly
545                 550                 555                 560

Gln Gln Leu Phe Ile Glu Ser Arg Ala Arg Pro Gln Ser Arg Pro Arg
                565                 570                 575

Leu Pro Ala Thr Gly Thr Phe Lys Ala Lys Ala Leu Pro Cys Gln Ser
                580                 585                 590

Pro Asp Pro Glu Leu Glu Ala Gly Ser Ala Pro Val Gln Ala Pro Leu
            595                 600                 605

Ala Leu Val Pro Glu Glu Ala Glu Arg Lys Glu Ala Ser Ser Cys Ser
        610                 615                 620

Tyr Gln Gln Ile Asn Cys Leu Asp Ser Ile Leu Arg Tyr Leu Glu Ser
625                 630                 635                 640

Cys Asn Leu Pro Ser Thr Thr Lys Arg Lys Cys Ala Ser Ser Ser Ser
                645                 650                 655

Tyr Thr Thr Ser Ser Ala Ser Asp Asp Asp Arg Gln Arg Thr Gly Pro
                660                 665                 670

Val Ser Val Gly Thr Lys Lys Asp Pro Pro Ser Ala Ala Leu Ser Gly
        675                 680                 685

Glu Gly Ala Thr Pro Arg Lys Glu Pro Val Val Gly Gly Thr Leu Ser
        690                 695                 700

Pro Leu Ala Leu Ala Asn Lys Ala Glu Ser Val Val Ser Val Thr Ser
```
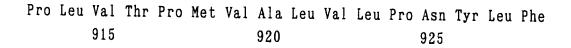
SPO-108

```
    705                      710                      715                      720
Gln Cys Ser Phe Ser Ser Thr Ile Val His Val Gly Asp Lys Lys Pro
                    725                      730                      735
Pro Glu Ser Asp Ile Ile Met Met Glu Asp Leu Pro Gly Leu Ala Pro
                    740                      745                      750
Gly Pro Ala Pro Ser Pro Ala Pro Ser Pro Thr Val Ala Pro Asp Pro
                    755                      760                      765
Ala Pro Asp Ala Tyr Arg Pro Val Gly Leu Thr Lys Ala Val Leu Ser
                770                      775                      780
Leu His Thr Gln Lys Glu Glu Gln Ala Phe Leu Ser Arg Phe Arg Asp
785                      790                      795                      800
Leu Gly Arg Leu Arg Gly Leu Asp Ser Ser Ser Thr Ala Pro Ser Ala
                    805                      810                      815
Leu Gly Glu Arg Gly Cys His His Gly Pro Ala Pro Pro Ser Arg Arg
                    820                      825                      830
His His Cys Arg Ser Lys Ala Lys Arg Ser Arg His His Gln Asn Pro
                835                      840                      845
Arg Ala Glu Ala Pro Cys Tyr Val Ser His Pro Ser Pro Val Pro Pro
    850                      855                      860
Ser Thr Pro Trp Pro Thr Pro Pro Ala Thr Thr Pro Phe Pro Ala Val
865                      870                      875                      880
Val Gln Pro Tyr Pro Leu Pro Val Phe Ser Pro Arg Gly Gly Pro Gln
                    885                      890                      895
Pro Leu Pro Pro Ala Pro Thr Ser Val Pro Pro Ala Ala Phe Pro Ala
                900                      905                      910
```

SPO-108

Pro Leu Val Thr Pro Met Val Ala Leu Val Leu Pro Asn Tyr Leu Phe
    915                  920              925

Pro Thr Pro Ser Ser Tyr Pro Tyr Gly Ala Leu Gln Thr Pro Ala Glu
    930                  935              940

Gly Pro Pro Thr Pro Ala Ser His Ser Pro Ser Pro Ser Leu Pro Ala
945                  950              955                  960

Leu Pro Pro Ser Pro Pro His Arg Pro Asp Ser Pro Leu Phe Asn Ser
                965              970              975

Arg Cys Ser Ser Pro Leu Gln Leu Asn Leu Leu Gln Leu Glu Glu Leu
                980              985              990

Pro Arg Ala Glu Gly Ala Ala Val Ala Gly Gly Pro Gly Ser Ser Ala
        995              1000             1005

Gly Pro Pro Pro Pro Ser Ala Glu Ala Ala Glu Pro Glu Ala Arg Leu
    1010             1015             1020

Ala Glu Val Thr Glu Ser Ser Asn Gln Asp Ala Leu Ser Gly Ser Ser
1025             1030             1035             1040

Asp Leu Leu Glu Leu Leu Leu Gln Glu Asp Ser Arg Ser Gly Thr Gly
            1045             1050             1055

Ser Ala Ala Ser Gly Ser Leu Gly Ser Gly Leu Gly Ser Gly Ser Gly
            1060             1065             1070

Ser Gly Ser His Glu Gly Gly Ser Thr Ser Ala Ser Ile Thr Arg Ser
        1075             1080             1085

Ser Gln Ser Ser His Thr Ser Lys Tyr Phe Gly Ser Ile Asp Ser Ser
        1090             1095             1100

Glu Ala Glu Ala Gly Ala Ala Arg Gly Gly Ala Glu Pro Gly Asp Gln
1105             1110             1115             1120

SPO-108

Val Ile Lys Tyr Val Leu Gln Asp Pro Ile Trp Leu Leu Met Ala Asn
           1125                1130              1135

Ala Asp Gln Arg Val Met Met Thr Tyr Gln Val Pro Ser Arg Asp Met
           1140                1145             1150

Thr Ser Val Leu Lys Gln Asp Arg Glu Arg Leu Arg Ala Met Gln Lys
           1155                1160             1165

Gln Gln Pro Arg Phe Ser Glu Asp Gln Arg Arg Glu Leu Gly Ala Val
       1170              1175              1180

His Ser Trp Val Arg Lys Gly Gln Leu Pro Arg Ala Leu Asp Val Met
1185             1190              1195           1200

Ala Cys Val Asp Cys Gly Ser Ser Thr Gln Asp Pro Gly His Pro Asp
           1205                1210             1215

Asp Pro Leu Phe Ser Glu Leu Asp Gly Leu Gly Leu Glu Pro Met Glu
           1220                1225             1230

Glu Gly Gly Gly Glu Gln Gly Ser Ser Gly Gly Gly Ser Gly Glu Gly
         1235              1240             1245

Glu Gly Cys Glu Glu Ala Gln Gly Gly Ala Lys Ala Ser Ser Ser Gln
       1250              1255             1260

Asp Leu Ala Met Glu Glu Glu Glu Glu Gly Arg Ser Ser Ser Ser Pro
1265             1270              1275           1280

Ala Leu Pro Thr Ala Gly Asn Cys Thr Ser
           1285                1290

<210> 2
<211> 1291
<212> PRT
<213> Mus musculus

SPO-108

<400> 2

Met Ser Gly Pro Leu Glu Gly Ala Asp Gly Gly Asp Pro Arg Pro
1                   5                   10                  15

Gly Glu Pro Phe Cys Pro Gly Gly Val Pro Ser Pro Gly Ala Pro Gln
                20                  25                  30

His Arg Pro Cys Pro Gly Pro Ser Leu Ala Asp Asp Thr Asp Ala Asn
                35                  40                  45

Ser Asn Gly Ser Ser Gly Asn Glu Ser Asn Gly Pro Glu Ser Arg Gly
                50                  55                  60

Ala Ser Gln Arg Ser Ser His Ser Ser Ser Ser Gly Asn Gly Lys Asp
65                  70                  75                  80

Ser Ala Leu Leu Glu Thr Thr Glu Ser Ser Lys Ser Thr Asn Ser Gln
                85                  90                  95

Ser Pro Ser Pro Pro Ser Ser Ser Ile Ala Tyr Ser Leu Leu Ser Ala
                100                 105                 110

Ser Ser Glu Gln Asp Asn Pro Ser Thr Ser Gly Cys Ser Ser Glu Gln
                115                 120                 125

Ser Ala Arg Ala Arg Thr Gln Lys Glu Leu Met Thr Ala Leu Arg Glu
                130                 135                 140

Leu Lys Leu Arg Leu Pro Pro Glu Arg Arg Gly Lys Gly Arg Ser Gly
145                 150                 155                 160

Thr Leu Ala Thr Leu Gln Tyr Ala Leu Ala Cys Val Lys Gln Val Gln
                165                 170                 175

Ala Asn Gln Glu Tyr Tyr Gln Gln Trp Ser Leu Glu Glu Gly Glu Pro
                180                 185                 190

Cys Ala Met Asp Met Ser Thr Tyr Thr Leu Glu Glu Leu Glu His Ile
      195                200             205

Thr Ser Glu Tyr Thr Leu Arg Asn Gln Asp Thr Phe Ser Val Ala Val
  210              215             220

Ser Phe Leu Thr Gly Arg Ile Val Tyr Ile Ser Glu Gln Ala Gly Val
225          230          235          240

Leu Leu Arg Cys Lys Arg Asp Val Phe Arg Gly Ala Arg Phe Ser Glu
        245          250          255

Leu Leu Ala Pro Gln Asp Val Gly Val Phe Tyr Gly Ser Thr Thr Pro
      260          265          270

Ser Arg Leu Pro Thr Trp Gly Thr Gly Thr Ser Ala Gly Ser Gly Leu
    275          280          285

Lys Asp Phe Thr Gln Glu Lys Ser Val Phe Cys Arg Ile Arg Gly Gly
  290             295          300

Pro Asp Arg Asp Pro Gly Pro Arg Tyr Gln Pro Phe Arg Leu Thr Pro
305          310          315          320

Tyr Val Thr Lys Ile Arg Val Ser Asp Gly Ala Pro Ala Gln Pro Cys
        325          330          335

Cys Leu Leu Ile Ala Glu Arg Ile His Ser Gly Tyr Glu Ala Pro Arg
      340          345          350

Ile Pro Pro Asp Lys Arg Ile Phe Thr Thr Arg His Thr Pro Ser Cys
    355          360          365

Leu Phe Gln Asp Val Asp Glu Arg Ala Ala Pro Leu Leu Gly Tyr Leu
  370             375          380

Pro Gln Asp Leu Leu Gly Ala Pro Val Leu Leu Phe Leu His Pro Glu
385          390          395          400

Asp Arg Pro Leu Met Leu Ala Ile His Lys Lys Ile Leu Gln Leu Ala
405                      410                      415

Gly Gln Pro Phe Asp His Ser Pro Ile Arg Phe Cys Ala Arg Asn Gly
420                      425                      430

Glu Tyr Val Thr Met Asp Thr Ser Trp Ala Gly Phe Val His Pro Trp
435                      440                      445

Ser Arg Lys Val Ala Phe Val Leu Gly Arg His Lys Val Arg Thr Ala
450                      455                      460

Pro Leu Asn Glu Asp Val Phe Thr Pro Pro Ala Pro Ser Pro Ala Pro
465                      470                      475                      480

Ser Leu Asp Ser Asp Ile Gln Glu Leu Ser Glu Gln Ile His Arg Leu
485                      490                      495

Leu Leu Gln Pro Val His Ser Ser Ser Pro Thr Gly Leu Cys Gly Val
500                      505                      510

Gly Pro Leu Met Ser Pro Gly Pro Leu His Ser Pro Gly Ser Ser Ser
515                      520                      525

Asp Ser Asn Gly Gly Asp Ala Glu Gly Pro Gly Pro Pro Ala Pro Val
530                      535                      540

Thr Phe Gln Gln Ile Cys Lys Asp Val His Leu Val Lys His Gln Gly
545                      550                      555                      560

Gln Gln Leu Phe Ile Glu Ser Arg Ala Lys Pro Pro Pro Arg Pro Arg
565                      570                      575

Leu Leu Ala Thr Gly Thr Phe Lys Ala Lys Val Leu Pro Cys Gln Ser
580                      585                      590

Pro Asn Pro Glu Leu Glu Val Ala Pro Val Pro Asp Gln Ala Ser Leu

SPO-108

```
               595                    600                    605

      Ala Leu Ala Pro Glu Glu Pro Glu Arg Lys Glu Thr Ser Gly Cys Ser
         610                    615                    620

      Tyr Gln Gln Ile Asn Cys Leu Asp Ser Ile Leu Arg Tyr Leu Glu Ser
      625                    630                    635                    640

      Cys Asn Ile Pro Ser Thr Thr Lys Arg Lys Cys Ala Ser Ser Ser Ser
                        645                    650                    655

      Tyr Thr Ala Ser Ser Ala Ser Asp Asp Asp Lys Gln Arg Ala Gly Pro
                   660                    665                    670

      Val Pro Val Gly Ala Lys Lys Asp Pro Ser Ser Ala Met Leu Ser Gly
              675                    680                    685

      Glu Gly Ala Thr Pro Arg Lys Glu Pro Val Val Gly Gly Thr Leu Ser
         690                    695                    700

      Pro Leu Ala Leu Ala Asn Lys Ala Glu Ser Val Val Ser Val Thr Ser
      705                    710                    715                    720

      Gln Cys Ser Phe Ser Ser Thr Ile Val His Val Gly Asp Lys Lys Pro
                        725                    730                    735

      Pro Glu Ser Asp Ile Ile Met Met Glu Asp Leu Pro Gly Leu Ala Pro
                   740                    745                    750

      Gly Pro Ala Pro Ser Pro Ala Pro Ser Pro Thr Val Ala Pro Asp Pro
                   755                    760                    765

      Thr Pro Asp Ala Tyr Arg Pro Val Gly Leu Thr Lys Ala Val Leu Ser
                   770                    775                    780

      Leu His Thr Gln Lys Glu Glu Gln Ala Phe Leu Asn Arg Phe Arg Asp
      785                    790                    795                    800
```

SPO-108

Leu Gly Arg Leu Arg Gly Leu Asp Thr Ser Ser Val Ala Pro Ser Ala
      805             810         815

Pro Gly Cys His His Gly Pro Ile Pro Pro Gly Arg Arg His His Cys
      820             825         830

Arg Ser Lys Ala Lys Arg Ser Arg His His His His Gln Thr Pro Arg
      835             840         845

Pro Glu Thr Pro Cys Tyr Val Ser His Pro Ser Pro Val Pro Ser Ser
850             855         860

Gly Pro Trp Pro Pro Pro Pro Ala Thr Thr Pro Phe Pro Ala Met Val
865         870         875         880

Gln Pro Tyr Pro Leu Pro Val Phe Ser Pro Arg Gly Gly Pro Gln Pro
         885         890         895

Leu Pro Pro Ala Pro Thr Ser Val Ser Pro Ala Thr Phe Pro Ser Pro
      900         905         910

Leu Val Thr Pro Met Val Ala Leu Val Leu Pro Asn Tyr Leu Phe Pro
      915         920         925

Thr Pro Pro Ser Tyr Pro Tyr Gly Val Ser Gln Ala Pro Val Glu Gly
      930         935         940

Pro Pro Thr Pro Ala Ser His Ser Pro Ser Pro Ser Leu Pro Pro Pro
945             950         955         960

Pro Leu Ser Pro Pro His Arg Pro Asp Ser Pro Leu Phe Asn Ser Arg
         965         970         975

Cys Ser Ser Pro Leu Gln Leu Asn Leu Leu Gln Leu Glu Glu Ser Pro
         980         985         990

Arg Thr Glu Gly Gly Ala Ala Ala Gly Gly Pro Gly Ser Ser Ala Gly
      995         1000        1005

Pro Leu Pro Pro Ser Glu Glu Thr Ala Glu Pro Glu Ala Arg Leu Val
   1010            1015           1020

Glu Val Thr Glu Ser Ser Asn Gln Asp Ala Leu Ser Gly Ser Ser Asp
1025           1030          1035           1040

Leu Leu Glu Leu Leu Leu Gln Glu Asp Ser Arg Ser Gly Thr Gly Ser
         1045          1050          1055

Ala Ala Ser Gly Ser Leu Gly Ser Gly Leu Gly Ser Gly Ser Gly Ser
         1060          1065          1070

Gly Ser His Glu Gly Gly Ser Thr Ser Ala Ser Ile Thr Arg Ser Ser
         1075          1080          1085

Gln Ser Ser His Thr Ser Lys Tyr Phe Gly Ser Ile Asp Ser Ser Glu
         1090          1095          1100

Ala Glu Ala Gly Ala Ala Arg Ala Arg Thr Glu Pro Gly Asp Gln Val
1105           1110          1115           1120

Ile Lys Cys Val Leu Gln Asp Pro Ile Trp Leu Leu Met Ala Asn Ala
         1125          1130          1135

Asp Gln Arg Val Met Met Thr Tyr Gln Val Pro Ser Arg Asp Ala Ala
         1140          1145          1150

Ser Val Leu Lys Gln Asp Arg Glu Arg Leu Arg Ala Met Gln Lys Gln
         1155          1160          1165

Gln Pro Arg Phe Ser Glu Asp Gln Arg Arg Glu Leu Gly Ala Val His
     1170          1175          1180

Ser Trp Val Arg Lys Gly Gln Leu Pro Arg Ala Leu Asp Val Met Ala
1185           1190          1195           1200

Cys Val Asp Cys Gly Ser Ser Val Gln Asp Pro Gly His Ser Asp Asp

```
                1205                    1210                    1215

        Pro Leu Phe Ser Glu Leu Asp Gly Leu Gly Leu Glu Pro Met Glu Glu
                  1220                    1225                    1230

        Gly Gly Gly Glu Gly Gly Gly Cys Gly Val Gly Gly Gly Gly Gly Asp
                  1235                    1240                    1245

        Gly Gly Glu Glu Ala Gln Thr Gln Ile Gly Ala Lys Gly Ser Ser Ser
                  1250                    1255                    1260

        Gln Asp Ser Ala Met Glu Glu Glu Glu Gln Gly Gly Gly Ser Ser Ser
        1265                    1270                    1275                    1280

        Pro Ala Leu Pro Ala Glu Glu Asn Ser Thr Ser
                          1285                    1290
```

<210> 3
<211> 3873
<212> DNA
<213> Homo sapiens

<220>
<221> CDS
<222> (1)..(3873)

<400> 3
```
atg agt ggc ccc cta gaa ggg gct gat ggg gga ggg gac ccc agg cct        48
Met Ser Gly Pro Leu Glu Gly Ala Asp Gly Gly Gly Asp Pro Arg Pro
1               5                   10                  15


ggg gaa tca ttt tgt cct ggg ggc gtc cca tcc cct ggg ccc cca cag        96
Gly Glu Ser Phe Cys Pro Gly Gly Val Pro Ser Pro Gly Pro Pro Gln
                20                  25                  30


cac cgg cct tgc cca ggc ccc agc ctg gcc gat gac acc gat gcc aac       144
His Arg Pro Cys Pro Gly Pro Ser Leu Ala Asp Asp Thr Asp Ala Asn
          35                  40                  45
```

```
agc aat ggt tca agt ggc aat gag tcc aac ggg cat gag tct aga ggc        192
Ser Asn Gly Ser Ser Gly Asn Glu Ser Asn Gly His Glu Ser Arg Gly
    50              55              60


gca tct cag cgg agc tca cac agc tcc tcc tca ggc aac ggc aag gac        240
Ala Ser Gln Arg Ser Ser His Ser Ser Ser Ser Gly Asn Gly Lys Asp
65              70              75              80


tca gcc ctg ctg gag acc act gag agc agc aag agc aca aac tct cag        288
Ser Ala Leu Leu Glu Thr Thr Glu Ser Ser Lys Ser Thr Asn Ser Gln
            85              90              95


agc cca tcc cca ccc agc agt tcc att gcc tac agc ctc ctg agt gcc        336
Ser Pro Ser Pro Pro Ser Ser Ser Ile Ala Tyr Ser Leu Leu Ser Ala
            100             105             110


agc tca gag cag gac aac ccg tcc acc agt ggc tgc agc agt gaa cag        384
Ser Ser Glu Gln Asp Asn Pro Ser Thr Ser Gly Cys Ser Ser Glu Gln
        115             120             125


tca gcc cgg gca agg act cag aag gaa ctc atg aca gca ctt cga gag        432
Ser Ala Arg Ala Arg Thr Gln Lys Glu Leu Met Thr Ala Leu Arg Glu
    130             135             140


ctc aag ctt cga ctg ccg cca gag cgc cgg ggc aag ggc cgc tct ggg        480
Leu Lys Leu Arg Leu Pro Pro Glu Arg Arg Gly Lys Gly Arg Ser Gly
145             150             155             160


acc ctg gcc acg ctg cag tac gca ctg gcc tgt gtc aag cag gtg cag        528
Thr Leu Ala Thr Leu Gln Tyr Ala Leu Ala Cys Val Lys Gln Val Gln
            165             170             175


gcc aac cag gaa tac tac cag cag tgg agc ctg gag gag ggc gag cct        576
Ala Asn Gln Glu Tyr Tyr Gln Gln Trp Ser Leu Glu Glu Gly Glu Pro
            180             185             190


tgc tcc atg gac atg tcc acc tat acc ctg gag gag ctg gag cac atc        624
```

```
        Cys Ser Met Asp Met Ser Thr Tyr Thr Leu Glu Glu Leu Glu His Ile
                 195                 200                 205


        acg tct gag tac aca ctt cag aac cag gat acc ttc tca gtg gct gtc      672
        Thr Ser Glu Tyr Thr Leu Gln Asn Gln Asp Thr Phe Ser Val Ala Val
                 210                 215                 220


        tcc ttc ctg acg ggc cga atc gtc tac att tcg gag cag gca gcc gtc      720
        Ser Phe Leu Thr Gly Arg Ile Val Tyr Ile Ser Glu Gln Ala Ala Val
        225                 230                 235                 240


        ctg ctg cgt tgc aag cgg gac gtg ttc cgg ggt acc cgc ttc tct gag      768
        Leu Leu Arg Cys Lys Arg Asp Val Phe Arg Gly Thr Arg Phe Ser Glu
                         245                 250                 255


        ctc ctg gct ccc cag gat gtg gga gtc ttc tat ggt tcc act gct cca      816
        Leu Leu Ala Pro Gln Asp Val Gly Val Phe Tyr Gly Ser Thr Ala Pro
                         260                 265                 270


        tct cgc ctg ccc acc tgg ggc aca ggg gcc tca gca ggt tca ggc ctc      864
        Ser Arg Leu Pro Thr Trp Gly Thr Gly Ala Ser Ala Gly Ser Gly Leu
                         275                 280                 285


        agg gac ttt acc cag gag aag tcc gtc ttc tgc cgt atc aga gga ggt      912
        Arg Asp Phe Thr Gln Glu Lys Ser Val Phe Cys Arg Ile Arg Gly Gly
                 290                 295                 300


        cct gac cgg gat cca ggg cct cgg tac cag cca ttc cgc cta acc ccg      960
        Pro Asp Arg Asp Pro Gly Pro Arg Tyr Gln Pro Phe Arg Leu Thr Pro
        305                 310                 315                 320


        tat gtg acc aag atc cgg gtc tca gat ggg gcc cct gca cag ccg tgc     1008
        Tyr Val Thr Lys Ile Arg Val Ser Asp Gly Ala Pro Ala Gln Pro Cys
                         325                 330                 335


        tgc ctg ctg att gca gag cgc atc cat tcg ggt tac gaa gct ccc cgg     1056
        Cys Leu Leu Ile Ala Glu Arg Ile His Ser Gly Tyr Glu Ala Pro Arg
                         340                 345                 350
```

ata ccc cct gac aag agg att ttc act acg cgg cac aca ccc agc tgc     1104
Ile Pro Pro Asp Lys Arg Ile Phe Thr Thr Arg His Thr Pro Ser Cys
      355               360            365

ctc ttc cag gat gtg gat gaa agg gct gcc ccc ctg ctg ggc tac ctg     1152
Leu Phe Gln Asp Val Asp Glu Arg Ala Ala Pro Leu Leu Gly Tyr Leu
      370               375            380

ccc cag gac ctc ctg ggg gcc cca gtg ctc ctg ttc ctg cat cct gag     1200
Pro Gln Asp Leu Leu Gly Ala Pro Val Leu Leu Phe Leu His Pro Glu
385              390            395            400

gac cga ccc ctc atg ctg gct atc cac aag aag att ctg cag ttg gcg     1248
Asp Arg Pro Leu Met Leu Ala Ile His Lys Lys Ile Leu Gln Leu Ala
            405            410            415

ggc cag ccc ttt gac cac tcc cct atc cgc ttc tgt gcc cgc aac ggg     1296
Gly Gln Pro Phe Asp His Ser Pro Ile Arg Phe Cys Ala Arg Asn Gly
            420            425            430

gag tat gtc acc atg gac acc agc tgg gct ggc ttt gtg cac ccc tgg     1344
Glu Tyr Val Thr Met Asp Thr Ser Trp Ala Gly Phe Val His Pro Trp
            435            440            445

agc cgc aag gta gcc ttc gtg ttg ggc cgc cac aaa gta cgc acg gcc     1392
Ser Arg Lys Val Ala Phe Val Leu Gly Arg His Lys Val Arg Thr Ala
      450               455            460

ccc ctg aat gag gac gtg ttc act ccc ccg gcc ccc agc cca gct ccc     1440
Pro Leu Asn Glu Asp Val Phe Thr Pro Pro Ala Pro Ser Pro Ala Pro
465              470            475            480

tcc ctg gac act gat atc cag gag ctg tca gag cag atc cac cgg ctg     1488
Ser Leu Asp Thr Asp Ile Gln Glu Leu Ser Glu Gln Ile His Arg Leu
            485            490            495

ctg ctg cag ccc gtc cac agc ccc agc ccc acg gga ctc tgt gga gtc     1536

Leu Leu Gln Pro Val His Ser Pro Ser Pro Thr Gly Leu Cys Gly Val
        500                 505               510

ggc gcc gtg aca tcc cca ggc cct ctc cac agc cct ggg tcc tcc agt     1584
Gly Ala Val Thr Ser Pro Gly Pro Leu His Ser Pro Gly Ser Ser Ser
        515                 520               525

gat agc aac ggg ggt gat gca gag ggg cct ggg cct cct gcg cca gtg     1632
Asp Ser Asn Gly Gly Asp Ala Glu Gly Pro Gly Pro Pro Ala Pro Val
        530                 535               540

act ttc cag cag atc tgt aag gat gtg cat ctg gtg aag cac cag ggc     1680
Thr Phe Gln Gln Ile Cys Lys Asp Val His Leu Val Lys His Gln Gly
545                 550               555               560

cag cag ctt ttt att gag tct cgg gcc cgg cct cag tcc cgg ccc cgc     1728
Gln Gln Leu Phe Ile Glu Ser Arg Ala Arg Pro Gln Ser Arg Pro Arg
            565                 570               575

ctc cct gct aca ggc acg ttc aag gcc aag gcc ctt ccc tgc caa tcc     1776
Leu Pro Ala Thr Gly Thr Phe Lys Ala Lys Ala Leu Pro Cys Gln Ser
        580                 585               590

cca gac cca gag ctg gag gcg ggt tct gct ccc gtc cag gcc cca cta     1824
Pro Asp Pro Glu Leu Glu Ala Gly Ser Ala Pro Val Gln Ala Pro Leu
        595                 600               605

gcc ttg gtc cct gag gag gcc gag agg aaa gaa gcc tcc agc tgc tcc     1872
Ala Leu Val Pro Glu Glu Ala Glu Arg Lys Glu Ala Ser Ser Cys Ser
        610                 615               620

tac cag cag atc aac tgc ctg gac agc atc ctc agg tac ctg gag agc     1920
Tyr Gln Gln Ile Asn Cys Leu Asp Ser Ile Leu Arg Tyr Leu Glu Ser
625                 630               635               640

tgc aac ctc ccc agc acc act aag cgt aaa tgt gcc tcc tcc tcc tcc     1968
Cys Asn Leu Pro Ser Thr Thr Lys Arg Lys Cys Ala Ser Ser Ser Ser
            645                 650               655

SPO-108

tat acc acc tcc tca gcc tct gac gac gac agg cag agg aca ggt cca    2016
Tyr Thr Thr Ser Ser Ala Ser Asp Asp Asp Arg Gln Arg Thr Gly Pro
          660                 665           670

gtc tct gtg ggg acc aag aaa gat ccg ccg tca gca gcg ctg tct ggg    2064
Val Ser Val Gly Thr Lys Lys Asp Pro Pro Ser Ala Ala Leu Ser Gly
          675                 680           685

gag ggg gcc acc cca cgg aag gag cca gtg gtg gga ggc acc ctg agc    2112
Glu Gly Ala Thr Pro Arg Lys Glu Pro Val Val Gly Gly Thr Leu Ser
          690                 695           700

ccg ctc gcc ctg gcc aat aag gcg gag agt gtg gtg tcc gtc acc agt    2160
Pro Leu Ala Leu Ala Asn Lys Ala Glu Ser Val Val Ser Val Thr Ser
705               710               715           720

cag tgt agc ttc agc tcc acc atc gtc cat gtg gga gac aag aag ccc    2208
Gln Cys Ser Phe Ser Ser Thr Ile Val His Val Gly Asp Lys Lys Pro
              725               730           735

ccg gag tcg gac atc atc atg atg gag gac ctg cct ggc cta gcc cca    2256
Pro Glu Ser Asp Ile Ile Met Met Glu Asp Leu Pro Gly Leu Ala Pro
              740               745           750

ggc cca gcc ccc agc cca gcc ccc agc ccc aca gta gcc cct gac cca    2304
Gly Pro Ala Pro Ser Pro Ala Pro Ser Pro Thr Val Ala Pro Asp Pro
          755                 760           765

gcc cca gac gcc tac cgt cca gtg ggg ctg acc aag gcc gtg ctg tcc    2352
Ala Pro Asp Ala Tyr Arg Pro Val Gly Leu Thr Lys Ala Val Leu Ser
          770               775           780

ctg cac aca cag aag gaa gag caa gcc ttc ctc agc cgc ttc cga gac    2400
Leu His Thr Gln Lys Glu Glu Gln Ala Phe Leu Ser Arg Phe Arg Asp
785               790               795           800

ctg ggc agg ctg cgt gga ctc gac agc tct tcc aca gct ccc tca gcc    2448

SPO-108

```
        Leu Gly Arg Leu Arg Gly Leu Asp Ser Ser Ser Thr Ala Pro Ser Ala
                    805                 810                 815


        ctt ggc gag cga ggc tgc cac cac ggc ccc gca ccc cca agc cgc cga     2496
        Leu Gly Glu Arg Gly Cys His His Gly Pro Ala Pro Pro Ser Arg Arg
                    820                 825                 830


        cac cac tgc cga tcc aaa gcc aag cgc tca cgc cac cac cag aac cct     2544
        His His Cys Arg Ser Lys Ala Lys Arg Ser Arg His His Gln Asn Pro
                    835                 840                 845


        cgg gct gaa gcg ccc tgc tat gtc tca cac ccc tca ccc gtg cca ccc     2592
        Arg Ala Glu Ala Pro Cys Tyr Val Ser His Pro Ser Pro Val Pro Pro
                    850                 855                 860


        tcc acc ccc tgg ccc acc cca cca gcc act acc ccc ttc cca gcg gtt     2640
        Ser Thr Pro Trp Pro Thr Pro Pro Ala Thr Thr Pro Phe Pro Ala Val
        865                 870                 875                 880


        gtc cag ccc tac cct ctc cca gtg ttc tct cct cga gga ggc ccc cag     2688
        Val Gln Pro Tyr Pro Leu Pro Val Phe Ser Pro Arg Gly Gly Pro Gln
                            885                 890                 895


        cct ctt ccc cct gct ccc aca tct gtg ccc cca gct gct ttc ccc gcc     2736
        Pro Leu Pro Pro Ala Pro Thr Ser Val Pro Pro Ala Ala Phe Pro Ala
                            900                 905                 910


        cct ttg gtg acc cca atg gtg gcc ttg gtg ctc cct aac tat ctg ttc     2784
        Pro Leu Val Thr Pro Met Val Ala Leu Val Leu Pro Asn Tyr Leu Phe
                    915                 920                 925


        cca acc cca tcc agc tat cct tat ggg gca ctc cag acc cct gct gaa     2832
        Pro Thr Pro Ser Ser Tyr Pro Tyr Gly Ala Leu Gln Thr Pro Ala Glu
                    930                 935                 940


        ggg cct ccc act cct gcc tcg cac tcc cct tct cca tcc ttg ccc gcc     2880
        Gly Pro Pro Thr Pro Ala Ser His Ser Pro Ser Pro Ser Leu Pro Ala
        945                 950                 955                 960
```

ctc ccc ccg agt cct cct cac cgc ccg gac tct cca ctg ttc aac tcg     2928
Leu Pro Pro Ser Pro Pro His Arg Pro Asp Ser Pro Leu Phe Asn Ser
         965             970             975

aga tgc agc tct cca ctc cag ctc aat ctg ctg cag ctg gag gag ctc     2976
Arg Cys Ser Ser Pro Leu Gln Leu Asn Leu Leu Gln Leu Glu Glu Leu
         980             985             990

ccc cgt gct gag ggg gct gct gtt gca gga ggc cct ggg agc agt gcc     3024
Pro Arg Ala Glu Gly Ala Ala Val Ala Gly Gly Pro Gly Ser Ser Ala
         995             1000           1005

ggg ccc cca cct ccc agt gcg gag gct gct gag cca gag gcc aga ctg     3072
Gly Pro Pro Pro Pro Ser Ala Glu Ala Ala Glu Pro Glu Ala Arg Leu
       1010           1015           1020

gcg gag gtc act gag tcc tcc aat cag gac gca ctt tcc ggc tcc agt     3120
Ala Glu Val Thr Glu Ser Ser Asn Gln Asp Ala Leu Ser Gly Ser Ser
1025           1030           1035           1040

gac ctg ctc gaa ctt ctg ctg caa gag gac tcg cgc tcc ggc aca ggc     3168
Asp Leu Leu Glu Leu Leu Leu Gln Glu Asp Ser Arg Ser Gly Thr Gly
         1045           1050           1055

tcc gca gcc tcg ggc tcc ttg ggc tct ggc ttg ggc tct ggg tct ggt     3216
Ser Ala Ala Ser Gly Ser Leu Gly Ser Gly Leu Gly Ser Gly Ser Gly
         1060           1065           1070

tca ggc tcc cat gaa ggg ggc agc acc tca gcc agc atc act cgc agc     3264
Ser Gly Ser His Glu Gly Gly Ser Thr Ser Ala Ser Ile Thr Arg Ser
         1075           1080           1085

agc cag agc agc cac aca agc aaa tac ttt ggc agc atc gac tct tcc     3312
Ser Gln Ser Ser His Thr Ser Lys Tyr Phe Gly Ser Ile Asp Ser Ser
         1090           1095           1100

gag gct gag gct ggg gct gct cgg ggc ggg gct gag cct ggg gac cag     3360

SPO-108

```
Glu Ala Glu Ala Gly Ala Ala Arg Gly Gly Ala Glu Pro Gly Asp Gln
1105              1110              1115              1120


gtg att aag tac gtg ctc cag gat ccc att tgg ctg ctc atg gcc aat      3408
Val Ile Lys Tyr Val Leu Gln Asp Pro Ile Trp Leu Leu Met Ala Asn
                 1125              1130              1135


gct gac cag cgc gtc atg atg acc tac cag gtg ccc tcc agg gac atg      3456
Ala Asp Gln Arg Val Met Met Thr Tyr Gln Val Pro Ser Arg Asp Met
                 1140              1145              1150


acc tct gtg ctg aag cag gat cgg gag cgg ctc cga gcc atg cag aag      3504
Thr Ser Val Leu Lys Gln Asp Arg Glu Arg Leu Arg Ala Met Gln Lys
                 1155              1160              1165


cag cag cct cgg ttt tct gag gac cag cgg cgg gaa ctg ggt gct gtg      3552
Gln Gln Pro Arg Phe Ser Glu Asp Gln Arg Arg Glu Leu Gly Ala Val
                 1170              1175              1180


cac tcc tgg gtc cgg aag ggc caa ctg cct cgg gct ctt gat gtg atg      3600
His Ser Trp Val Arg Lys Gly Gln Leu Pro Arg Ala Leu Asp Val Met
1185              1190              1195              1200


gcc tgt gtg gac tgt ggg agc agc acc caa gat cct ggt cac cct gat      3648
Ala Cys Val Asp Cys Gly Ser Ser Thr Gln Asp Pro Gly His Pro Asp
                 1205              1210              1215


gac cca ctc ttc tca gag ctg gat gga ctg ggg ctg gag ccc atg gaa      3696
Asp Pro Leu Phe Ser Glu Leu Asp Gly Leu Gly Leu Glu Pro Met Glu
                 1220              1225              1230


gag ggt gga ggc gag cag ggc agc agc ggt ggc ggc agt ggt gag gga      3744
Glu Gly Gly Gly Glu Gln Gly Ser Ser Gly Gly Gly Ser Gly Glu Gly
                 1235              1240              1245


gag ggc tgc gag gag gcc caa ggc ggg gcc aag gct tca agc tct cag      3792
Glu Gly Cys Glu Glu Ala Gln Gly Gly Ala Lys Ala Ser Ser Ser Gln
                 1250              1255              1260
```

```
gac ttg gct atg gag gag gag gaa gaa ggc agg agc tca tcc agt cca      3840
Asp Leu Ala Met Glu Glu Glu Glu Glu Gly Arg Ser Ser Ser Ser Pro
1265             1270            1275            1280


gcc tta cct aca gca gga aac tgc acc agc tag                          3873
Ala Leu Pro Thr Ala Gly Asn Cys Thr Ser
                1285            1290
```

<210> 4
<211> 3876
<212> DNA
<213> Mus musculus

<220>
<221> CDS
<222> (1)..(3876)

<400> 4

```
atg agt ggt ccc cta gaa ggg gcc gat ggg gga gga gac ccc agg ccc      48
Met Ser Gly Pro Leu Glu Gly Ala Asp Gly Gly Gly Asp Pro Arg Pro
1               5               10              15


gga gaa cct ttt tgt cct gga gga gtc cca tcc cct ggg gcc ccg cag      96
Gly Glu Pro Phe Cys Pro Gly Gly Val Pro Ser Pro Gly Ala Pro Gln
                20              25              30


cac cgg cct tgt cca ggc ccc agc ctg gct gat gac act gat gca aac      144
His Arg Pro Cys Pro Gly Pro Ser Leu Ala Asp Asp Thr Asp Ala Asn
            35              40              45


agc aat ggc tca agt ggc aat gag tcc aac gga ccc gag tcc agg ggc      192
Ser Asn Gly Ser Ser Gly Asn Glu Ser Asn Gly Pro Glu Ser Arg Gly
            50              55              60


gca tct cag cgg agt tct cat agt tcc tct tct ggc aat ggc aag gac      240
Ala Ser Gln Arg Ser Ser His Ser Ser Ser Ser Gly Asn Gly Lys Asp
65              70              75              80
```

```
tca gct ctg ctg gag acc act gag agc agc aag agt aca aac tca cag        288
Ser Ala Leu Leu Glu Thr Thr Glu Ser Ser Lys Ser Thr Asn Ser Gln
              85                  90                  95

agc cca tcc cca ccc agc agc tcc att gcc tac agc ctc ctg agt gcg        336
Ser Pro Ser Pro Pro Ser Ser Ser Ile Ala Tyr Ser Leu Leu Ser Ala
                  100                 105                 110

agc tca gag cag gac aac cca tct acc agt ggc tgc agc agt gaa cag        384
Ser Ser Glu Gln Asp Asn Pro Ser Thr Ser Gly Cys Ser Ser Glu Gln
              115                 120                 125

tca gct cga gcc agg acc cag aaa gaa ctc atg act gca ctt cgg gag        432
Ser Ala Arg Ala Arg Thr Gln Lys Glu Leu Met Thr Ala Leu Arg Glu
          130                 135                 140

ctc aaa ctt cga ctg cca cca gag cgt cgg ggc aag ggc cgc tct ggg        480
Leu Lys Leu Arg Leu Pro Pro Glu Arg Arg Gly Lys Gly Arg Ser Gly
145                 150                 155                 160

acc ttg gcc aca ctg cag tac gct ctg gcc tgt gtc aag cag gtt cag        528
Thr Leu Ala Thr Leu Gln Tyr Ala Leu Ala Cys Val Lys Gln Val Gln
                  165                 170                 175

gct aac cag gaa tat tac cag cag tgg agt ctg gag gag ggt gag cct        576
Ala Asn Gln Glu Tyr Tyr Gln Gln Trp Ser Leu Glu Glu Gly Glu Pro
              180                 185                 190

tgt gcc atg gac atg tct act tac acc ctg gag gaa ttg gag cat atc        624
Cys Ala Met Asp Met Ser Thr Tyr Thr Leu Glu Glu Leu Glu His Ile
          195                 200                 205

aca tcc gaa tac aca ctt cga aac cag gac acc ttc tct gtg gct gtg        672
Thr Ser Glu Tyr Thr Leu Arg Asn Gln Asp Thr Phe Ser Val Ala Val
210                 215                 220

tcc ttc ctg aca ggc cgg att gtc tat att tcg gag cag gca ggt gtc        720
```

SPO-108

```
Ser Phe Leu Thr Gly Arg Ile Val Tyr Ile Ser Glu Gln Ala Gly Val
225             230             235             240


ctg ctg cgt tgc aaa cgg gat gtg ttt cgg ggt gcc cgc ttc tca gag      768
Leu Leu Arg Cys Lys Arg Asp Val Phe Arg Gly Ala Arg Phe Ser Glu
                245             250             255


ctc ctg gct ccc cag gat gtg ggt gtc ttc tat ggc tct act aca cca      816
Leu Leu Ala Pro Gln Asp Val Gly Val Phe Tyr Gly Ser Thr Thr Pro
                260             265             270


tct cga ctg ccc acc tgg ggc act ggc acc tct gca ggt tca ggt ctc      864
Ser Arg Leu Pro Thr Trp Gly Thr Gly Thr Ser Ala Gly Ser Gly Leu
            275             280             285


aag gac ttc acc cag gaa aag tct gtc ttc tgc cga atc aga gga ggt      912
Lys Asp Phe Thr Gln Glu Lys Ser Val Phe Cys Arg Ile Arg Gly Gly
        290             295             300


cct gac cgg gat cca ggg cct cgg tac cag cca ttc cgc cta acc cca      960
Pro Asp Arg Asp Pro Gly Pro Arg Tyr Gln Pro Phe Arg Leu Thr Pro
305             310             315             320


tat gtg acc aag att cgg gtc tca gat gga gcc cct gca cag ccg tgc     1008
Tyr Val Thr Lys Ile Arg Val Ser Asp Gly Ala Pro Ala Gln Pro Cys
                325             330             335


tgc cta ctc att gcc gag cgc atc cac tct ggt tat gaa gct ccc cgg     1056
Cys Leu Leu Ile Ala Glu Arg Ile His Ser Gly Tyr Glu Ala Pro Arg
                340             345             350


atc cct cct gac aag agg atc ttc acc acc cga cac aca cca agc tgc     1104
Ile Pro Pro Asp Lys Arg Ile Phe Thr Thr Arg His Thr Pro Ser Cys
                355             360             365


ctc ttc cag gat gta gat gaa agg gct gcc cca ctg ctg ggt tac ctt     1152
Leu Phe Gln Asp Val Asp Glu Arg Ala Ala Pro Leu Leu Gly Tyr Leu
            370             375             380
```

```
ccc cag gat ctc ctg ggg gct cca gta ctt ctc ttt cta cat cct gag      1200
Pro Gln Asp Leu Leu Gly Ala Pro Val Leu Leu Phe Leu His Pro Glu
385             390             395             400

gac cga ccc ctc atg ctg gcc att cat aag aag ata ctg cag ctg gca      1248
Asp Arg Pro Leu Met Leu Ala Ile His Lys Lys Ile Leu Gln Leu Ala
            405             410             415

ggc cag ccc ttt gac cat tcc cct att cgc ttc tgt gct cgg aac ggg      1296
Gly Gln Pro Phe Asp His Ser Pro Ile Arg Phe Cys Ala Arg Asn Gly
            420             425             430

gaa tat gtc acc atg gac acc agc tgg gcc ggt ttt gtg cac ccc tgg      1344
Glu Tyr Val Thr Met Asp Thr Ser Trp Ala Gly Phe Val His Pro Trp
            435             440             445

agc cgc aag gtg gct ttc gtg ttg ggt cgc cat aaa gtg cgc acg gca      1392
Ser Arg Lys Val Ala Phe Val Leu Gly Arg His Lys Val Arg Thr Ala
            450             455             460

ccc ctg aat gag gac gtc ttc act ccc cca gcc ccc agc cca gct ccg      1440
Pro Leu Asn Glu Asp Val Phe Thr Pro Pro Ala Pro Ser Pro Ala Pro
465             470             475             480

tcc ctg gac tct gat atc cag gag ctc tca gag cag atc cat cga ttg      1488
Ser Leu Asp Ser Asp Ile Gln Glu Leu Ser Glu Gln Ile His Arg Leu
            485             490             495

ctg ctg cag cct gtg cac agc tcc agc ccc acg ggg ctc tgt gga gtt      1536
Leu Leu Gln Pro Val His Ser Ser Ser Pro Thr Gly Leu Cys Gly Val
            500             505             510

ggc cct ctg atg tcc cct ggt cct cta cac agc cct ggc tcc tcc agt      1584
Gly Pro Leu Met Ser Pro Gly Pro Leu His Ser Pro Gly Ser Ser Ser
            515             520             525

gat agc aat ggg ggg gac gct gag ggg cct ggg cct cct gct cca gtg      1632
```

```
        Asp Ser Asn Gly Gly Asp Ala Glu Gly Pro Gly Pro Pro Ala Pro Val
            530                 535                 540


        act ttc cag cag atc tgt aag gat gtg cat ctg gta aag cac cag gga    1680
        Thr Phe Gln Gln Ile Cys Lys Asp Val His Leu Val Lys His Gln Gly
        545                 550                 555                 560


        caa cag ctc ttc att gaa tct cgg gcc aag ccc cca ccc cgg ccc cgc    1728
        Gln Gln Leu Phe Ile Glu Ser Arg Ala Lys Pro Pro Pro Arg Pro Arg
                            565                 570                 575


        ctc ctt gct aca ggt aca ttc aaa gcc aaa gtc ctt ccc tgc cag tcc    1776
        Leu Leu Ala Thr Gly Thr Phe Lys Ala Lys Val Leu Pro Cys Gln Ser
                        580                 585                 590


        cca aac ccc gaa ctg gag gtg gcc cca gtt cct gac caa gcc tcg tta    1824
        Pro Asn Pro Glu Leu Glu Val Ala Pro Val Pro Asp Gln Ala Ser Leu
                    595                 600                 605


        gcc ttg gcc cct gag gag cca gag agg aaa gaa acc tct ggc tgt tcc    1872
        Ala Leu Ala Pro Glu Glu Pro Glu Arg Lys Glu Thr Ser Gly Cys Ser
            610                 615                 620


        tac cag cag atc aac tgc ctg gac agc atc ctc agg tat ttg gag agc    1920
        Tyr Gln Gln Ile Asn Cys Leu Asp Ser Ile Leu Arg Tyr Leu Glu Ser
        625                 630                 635                 640


        tgc aac att ccc agt aca acc aag cgt aaa tgt gcc tcc tcc tcc tcc    1968
        Cys Asn Ile Pro Ser Thr Thr Lys Arg Lys Cys Ala Ser Ser Ser Ser
                            645                 650                 655


        tac act gcc tct tca gcc tct gat gat gac aag cag agg gca ggt cca    2016
        Tyr Thr Ala Ser Ser Ala Ser Asp Asp Asp Lys Gln Arg Ala Gly Pro
                        660                 665                 670


        gtt cct gtg ggg gcc aag aaa gat ccg tcg tca gca atg ctg tct ggg    2064
        Val Pro Val Gly Ala Lys Lys Asp Pro Ser Ser Ala Met Leu Ser Gly
                    675                 680                 685
```

SPO-108

```
gag ggg gca act cct cgg aag gag cca gtg gtg gga ggc acc ctg agc      2112
Glu Gly Ala Thr Pro Arg Lys Glu Pro Val Val Gly Gly Thr Leu Ser
    690                     695                 700

ccg ctc gcc ctg gcc aat aag gca gag agc gtg gtg tcc gtc acc agt      2160
Pro Leu Ala Leu Ala Asn Lys Ala Glu Ser Val Val Ser Val Thr Ser
705             710                 715                 720

cag tgt agc ttc agc tcc acc atc gtc cat gtg gga gac aag aag ccc      2208
Gln Cys Ser Phe Ser Ser Thr Ile Val His Val Gly Asp Lys Lys Pro
            725                 730                 735

ccg gag tcg gac atc atc atg atg gaa gac ctg cct ggc ctg gcc cct      2256
Pro Glu Ser Asp Ile Ile Met Met Glu Asp Leu Pro Gly Leu Ala Pro
            740                 745                 750

ggc cca gcc ccc agt ccg gcc ccc agc ccc aca gta gcc cct gac cca      2304
Gly Pro Ala Pro Ser Pro Ala Pro Ser Pro Thr Val Ala Pro Asp Pro
            755                 760                 765

acc cca gat gct tat cgc cca gtg ggt ctg acc aag gcc gtg ctg tcc      2352
Thr Pro Asp Ala Tyr Arg Pro Val Gly Leu Thr Lys Ala Val Leu Ser
    770                 775                 780

ctg cac aca cag aag gaa gag caa gcc ttc ctc aac cgc ttc aga gat      2400
Leu His Thr Gln Lys Glu Glu Gln Ala Phe Leu Asn Arg Phe Arg Asp
785                 790                 795                 800

ctt ggc agg ctt cgt gga ctt gac acc tct tct gtg gcc ccc tca gcc      2448
Leu Gly Arg Leu Arg Gly Leu Asp Thr Ser Ser Val Ala Pro Ser Ala
                805                 810                 815

cct ggc tgc cac cat ggc ccc att ccc cct ggt cgc cga cac cac tgc      2496
Pro Gly Cys His His Gly Pro Ile Pro Pro Gly Arg Arg His His Cys
            820                 825                 830

cga tct aaa gca aag cgt tcc cgc cac cac cac cac cag acc ccc cgg      2544
```

SPO-108

```
Arg Ser Lys Ala Lys Arg Ser Arg His His His His Gln Thr Pro Arg
        835             840             845


ccc gaa act ccc tgc tat gtc tcc cat cct tca cct gtg ccc tct tct      2592
Pro Glu Thr Pro Cys Tyr Val Ser His Pro Ser Pro Val Pro Ser Ser
        850             855             860


gga ccc tgg cca ccc cca cca gcc acg acc ccc ttc cca gca atg gtc      2640
Gly Pro Trp Pro Pro Pro Pro Ala Thr Thr Pro Phe Pro Ala Met Val
865             870             875             880


cag ccc tac cca ctc cca gta ttc tcc cct cga gga gga ccc cag ccc      2688
Gln Pro Tyr Pro Leu Pro Val Phe Ser Pro Arg Gly Gly Pro Gln Pro
                885             890             895


ctt ccc cct gcc cct aca tct gtg tcc cct gct acc ttc cct tct ccc      2736
Leu Pro Pro Ala Pro Thr Ser Val Ser Pro Ala Thr Phe Pro Ser Pro
                900             905             910


tta gtg acc cca atg gtg gcc ttg gtg ctc cct aac tat cta ttc cct      2784
Leu Val Thr Pro Met Val Ala Leu Val Leu Pro Asn Tyr Leu Phe Pro
                915             920             925


acc cca cct agt tat cca tat ggg gtg tcc cag gcc cct gtt gag ggg      2832
Thr Pro Pro Ser Tyr Pro Tyr Gly Val Ser Gln Ala Pro Val Glu Gly
        930             935             940


cca ccc acg cct gct tcc cac tcg ccc tct cca tcc ctg ccc cca cca      2880
Pro Pro Thr Pro Ala Ser His Ser Pro Ser Pro Ser Leu Pro Pro Pro
945             950             955             960


cct ctc agc ccc ccc cac cgc cca gac tcc cca ctg ttc aac tcg aga      2928
Pro Leu Ser Pro Pro His Arg Pro Asp Ser Pro Leu Phe Asn Ser Arg
                965             970             975


tgc agc tcc cca ctc cag ctc aat ctg ctg cag ctt gag gag tcc ccc      2976
Cys Ser Ser Pro Leu Gln Leu Asn Leu Leu Gln Leu Glu Glu Ser Pro
                980             985             990
```

```
cgc acg gag ggg ggc gct gct gca gga ggc cca gga agc agt gct ggg      3024
Arg Thr Glu Gly Gly Ala Ala Ala Gly Gly Pro Gly Ser Ser Ala Gly
        995              1000 .            1005

ccc ctg cct ccc agt gag gag act gct gag cca gag gcc aga ttg gtg      3072
Pro Leu Pro Pro Ser Glu Glu Thr Ala Glu Pro Glu Ala Arg Leu Val
    1010              1015              1020

gag gtt act gag tcg tcc aat cag gat gca ctt tca ggc tcc agc gac      3120
Glu Val Thr Glu Ser Ser Asn Gln Asp Ala Leu Ser Gly Ser Ser Asp
1025              1030              1035              1040

ctg ctg gag cta ctg ctc caa gaa gac tct cgc tcg ggc aca ggc tcc      3168
Leu Leu Glu Leu Leu Leu Gln Glu Asp Ser Arg Ser Gly Thr Gly Ser
              1045              1050              1055

gca gcc tca ggc tcc ctg ggc tct ggc ctg ggc tct ggg tct ggt tca      3216
Ala Ala Ser Gly Ser Leu Gly Ser Gly Leu Gly Ser Gly Ser Gly Ser
              1060              1065              1070

gga tcc cac gaa ggg gga agc acc tca gcc agc atc acc cgc agc agt      3264
Gly Ser His Glu Gly Gly Ser Thr Ser Ala Ser Ile Thr Arg Ser Ser
        1075              1080              1085

cag agc agc cat aca agc aag tac ttt ggc agc atc gac tct tcc gag      3312
Gln Ser Ser His Thr Ser Lys Tyr Phe Gly Ser Ile Asp Ser Ser Glu
        1090              1095              1100

gct gaa gct ggg gct gct cgg gcc agg act gag cct ggg gac cag gtc      3360
Ala Glu Ala Gly Ala Ala Arg Ala Arg Thr Glu Pro Gly Asp Gln Val
1105              1110              1115              1120

att aag tgt gtg ctc cag gac ccc atc tgg ctg ctc atg gcc aat gcc      3408
Ile Lys Cys Val Leu Gln Asp Pro Ile Trp Leu Leu Met Ala Asn Ala
              1125              1130              1135

gac cag cgt gtc atg atg aca tac cag gtg ccg tcc agg gat gca gcc      3456
```

SPO-108

```
Asp Gln Arg Val Met Met Thr Tyr Gln Val Pro Ser Arg Asp Ala Ala
        1140                1145                1150


tct gtg ctg aag caa gac cgg gag agg ctc cgg gcc atg cag aaa cag    3504
Ser Val Leu Lys Gln Asp Arg Glu Arg Leu Arg Ala Met Gln Lys Gln
        1155                1160                1165


cag cca cgg ttc tca gag gac cag agg cgg gaa ctg ggt gct gtg cac    3552
Gln Pro Arg Phe Ser Glu Asp Gln Arg Arg Glu Leu Gly Ala Val His
        1170                1175                1180


tcc tgg gtc cgg aag ggc cag ctg cct cgg gcc ctt gat gtg atg gcg    3600
Ser Trp Val Arg Lys Gly Gln Leu Pro Arg Ala Leu Asp Val Met Ala
1185                1190                1195                1200


tgt gtg gac tgt ggc agc agc gtt caa gat cct ggc cac tct gat gac    3648
Cys Val Asp Cys Gly Ser Ser Val Gln Asp Pro Gly His Ser Asp Asp
                1205                1210                1215


ccg ctc ttc tca gaa ctg gat gga ttg ggg ctg gag ccc atg gaa gag    3696
Pro Leu Phe Ser Glu Leu Asp Gly Leu Gly Leu Glu Pro Met Glu Glu
                1220                1225                1230


ggt gga ggc gag ggt ggt ggg tgt ggt gtt ggc ggc ggt ggg ggt gat    3744
Gly Gly Gly Glu Gly Gly Gly Cys Gly Val Gly Gly Gly Gly Gly Asp
        1235                1240                1245


ggt ggt gag gag gcc cag acc caa att ggg gct aag ggt tca agc tct    3792
Gly Gly Glu Glu Ala Gln Thr Gln Ile Gly Ala Lys Gly Ser Ser Ser
        1250                1255                1260


cag gac tct gcc atg gag gaa gaa gag caa ggt ggg ggc tca tcc agc    3840
Gln Asp Ser Ala Met Glu Glu Glu Glu Gln Gly Gly Gly Ser Ser Ser
1265                1270                1275                1280


cca gct tta cct gca gaa gaa aac agc acc agc tag                    3876
Pro Ala Leu Pro Ala Glu Glu Asn Ser Thr Ser
                1285                1290
```